9.0 LIFECYCLE MANAGEMENT STRATEGY

The Lifecycle Management section of this plan is structured to maximise usability for the range of people involved in delivering the Council's Transportation services, through the effective and efficient management of transportation assets.

This section of Selwyn District Council's Activity Management Planning was completely reviewed in 2017. Council's Lifecycle Management Strategy was updated, to ensure that robust data collection and assessment processes for roading asset condition and performance was documented in the 2018-2028 Long Term Plan. The asset management and life cycle management activities related to transportation assets – including asset acquisitions, improvements and disposal strategies – have been further developed in preparing the 2021-2031 Activity Management Plan.

A Maintenance, Operations and Renewals Plan was also developed in 2017 to support the delivery of both asset management objectives and work programmes in response to this Strategy. This describes the operations, maintenance and renewal of existing assets, in addition to the administration and non-asset functions associated with the management of the network.

The 2021-2031 Lifecycle Management planning for the Council's transportation assets is now also read in conjunction with the Selwyn District Council Programme Business Case to support the 2021/22 – 2023/24 National Land Transport Programme. This documentation details the Council's response to Waka Kotahi NZTA, in support of the funding requested for local Transportation service delivery.

Section 9.1 of this Lifecycle Management Plan, and the "Network Components" and "Asset Group Details" (Sections 9.1.3 and 9.1.4) are structured in the same manner as the Programme Business Case – making these companion documents easier to read and manage as a suite of information for Asset Management practice.

Contents

9.1 Lifecycle Management Strategy

9.1.1 Lifecycle Management - An Overview

This section of the Activity Management Plan describes the life cycle management plans for each asset group. The asset groups and their principal components are:

- Sealed Road Pavements
    - Formation
    - Structural Layers
    - Sub-base
    - Basecourse
    - Shoulders
    - Surface
- Unsealed Road Pavements
    - Formation
    - Sub-base
    - Basecourse
    - Fords
    - Shoulders
    - Wearing course
- Drainage
    - Culverts
    - Surface Water Channels
    - Kerbs and channels
    - Sumps and soak holes
- Street Lighting
    - Lights
    - Poles
    - Brackets
- Network (Traffic) Services
    - Road Signs and Posts
    - Pavement Markings *
    - Roadside/Street Furniture
    - Traffic Calming and Traffic Controls
- Traffic Signals
- Rail Level Crossings
- Footpaths and Cycleways
    - Base
    - Surface

- Bridges and Structures
    - Management of waterways at bridges and culvert structures
    - Bridge abutments and piers
    - Bridge decks
    - Retaining Walls
    - Guardrails, handrails and sight rails
    - Cattle Stops and Gates
- Passenger Transport
    - Passenger Transport Infrastructure
    - Bus Stops, Shelters and Street Furniture

The lifecycle management plans for each of these asset groups detail the methods and actions planned to deliver the agreed levels of service, while optimising life cycle costs. The life cycle management plans cover:

- Asset data and information, identifying:
    - The scope and nature of the assets.
    - All new Council-owned assets acquired by the organisation over time.
    - The current condition of Council's assets.
    - The current capacity, performance and expected deterioration of the assets over time, relative to the adopted level of service.
    - Demand projections and risks to the assets during their life cycle.
    - Assets that have reached the end of their useful lives, requiring renewal, replacement, upgrade (improvements) or disposal.
- Management of, and standards for, all asset life cycle work activity — operations, maintenance, renewals, new improvements and disposals.
- Costs and timings of identified work (current and shorter-term forward works programmes) and forecast work needs over the longer term.
- Management of operations, which:
    - Support optimised asset life cycles
    - Deliver the adopted asset life cycle management strategies.

Life cycle management also includes operational activities which under-pin the optimised acquisition, use and disposal of the Council's transportation assets. These groups are considered to be non-asset activities, but are covered in this life cycle management strategy:

- Environmental Management
    - Roadside vegetation
    - Snow clearing and ice control programmes
    - Litter collection, graffiti removal, spillage clean-up and sweeping operations
    - Clearing damaged and/or abandoned vehicles from council-maintained roads
    - Clearing debris material and excess water on council-maintained roads, resulting from weather events
- Network (Traffic) Services
    - Pavement Markings *

- Operations/Network Management
  - Asset Management and activity management undertaken by the Council's Transportation team and through the professional services contract
  - Asset Management Information Systems (AMIS) costs
  - Contract Management and service delivery undertaken by the Council's Transportation team and through the works contracts
  - Performance monitoring, Quality Assurance and supervision
  - Improvements and investment planning
  - Transportation Planning
  - Travel Demand Management
  - Planning for bus and rail services supporting Council's transportation activities
  - Road corridor management
  - Temporary Traffic Management
  - Corporate operations
- Road Safety
  - Education/Enforcement/Engineering
  - Road Safety works, advertising and promotional activities
  - Behaviour/Walking and Cycling
- Emergency Works and Emergency Management

9.1.2 Lifecycle Analysis – Network Summary

At a whole-of-network level, the asset groups and their principal components are currently valued as shown in Table 9.1. The relative significance of each asset group based on their replacement cost is shown in Figure 9.1

Table 9.2: Summary of the Transportation Services

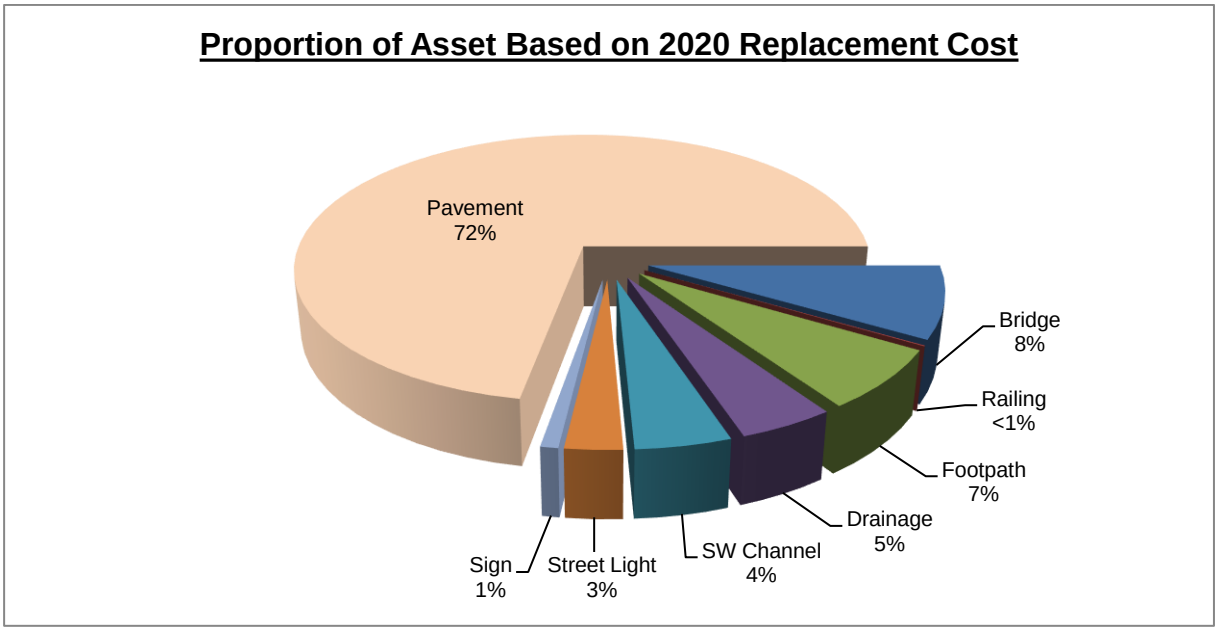
Asset Type	Component	Replacement Cost	Annual Depreciation	Unit	Quantity
Pavement *	Subgrade	$ 145,298,413	$ -	m	2,524,385
	Sub-base	$ 135,392,825	$ -	m	2,524,385
	Basecourse	$ 227,784,720	$ 5,132,284	m	2,524,385
	Top Surface	$ 90,492,094	$ 5,129,659	m	2,525,072
	Total	**$ 598,968,052**	**$ 10,261,943**		
Drainage	Culverts	$ 22,574,214	$ 237,266	m	33,921
	Structures	$ 14,581,315	$ 389,856	each	8,228
	Total	**$ 37,155,529**	**$ 627,122**		
SW Channel	SW Channel	$ 36,941,682	$ 468,078	m	508,429
	Total	**$ 36,941,682**	**$ 468,078**		
Street Light	Light	$ 4,927,815	$ 306,755	each	7,129
	Bracket	$ 2,544,761	$ 63,250	each	7,102
	Pole	$ 14,644,828	$ 365,591	each	7,102
	Total	**$ 22,117,404**	**$ 735,596**		

Asset Type	Component	Replacement Cost	Annual Depreciation	Unit	Quantity
Sign & Markings	Sign	$ 6,851,581	$ 565,863	each	18,373
	Total	**$ 6,851,581**	**$ 565,863**		
Railing	Railing	$ 701,582	$ 18,252	m	5,116
	Total	**$ 701,582**	**$ 18,252**		
Footpath	Footpath	$ 57,160,975	$ 1,672,294	m	386,076
	Total	**$ 57,160,975**	**$ 1,672,294**		
Bridge	Bridge (Deck)	$ 69,244,651	$ 625,662	each	140
	Total	**$ 69,244,651**	**$ 625,662**		
	Total	**$ 829,141,456**	**$ 14,974,809**		

Source: Valuation Report (BECA, 2020)

* Pavement (or Treatment Length) is used in the roading valuation to report combined replacement cost and depreciation for both sealed roads and unsealed roads. Treatment length measurements are expected to be lower than network road length.

Figure 9.2: Asset Breakdown — by Sub-Asset Replacement Cost



Source: Valuation Report (BECA, 2020)

The network is also often classified by surface type (grouping all surfaced roads under the 'sealed' category) and whether the roads are in urban or rural areas. Table 9.3 summarises the inventory by those classifications.

Table 9.4: Network Summary — Length (km)

	Sealed	Unsealed	Network
Urban	329.0	3.0 *	332.0
Rural	1,181.0	1,119.0	2,300.0
Both	1,510.0	1,119.0 *	2,632.0

Tables 9.5 and 9.6 show that 57% of the network (by length) consists of sealed roads, and these contribute to over 96% of the use of the network (478 million VKT's out of the total 497 million VKT's)

Table 9.7: Network Summary – Proportion of Total Lengths

	Sealed	Unsealed	Network
Urban	12.5%	0.1% *	12.6%
Rural	44.9%	42.5%	87.4%
Both	57.4%	42.5% *	100.0%

* Urban – Unsealed network length is reported from roading data. These are roads which have been constructed to sealed road specifications, but are currently not surfaced. They are excluded from the unsealed road length totals, but included in total network length calculations.

Table 9.8: Network Summary —Road Network Use (Percentage by Vehicle Kilometres Travelled)

	Sealed	Unsealed	Network
Urban	21.96%	<0.01%	21.96%
Rural	74.38%	3.66%	78.04%
Both	96.34%	3.66%	100.00%

The majority of sealed roads are surfaced with chip seal, which is appropriate for the rural roads in the District and is the level of service preferred by most rural users.

9.1.3 Network Components

The roading network comprises of the following assets or services.

Table 9.9: Asset Groups and Principal Components

	**Land** Land within the road reserve is a Council owned non-depreciating asset. Land under formed and maintained roads can be estimated from council data at between 5,000 and 5,500 Hectares. The total land parcel for roads within the District – which includes 'paper' roads - amounts to about Hectares.
	**Pavements** Pavements consist of formation (or sub-grade) layers overlaying road reserve land, structural layers and surfacing/wearing course layers - upon which vehicles pass over to travel between destinations. The **surface** of the pavement is often sealed using chipseal, asphalt or concrete in order to preserve the underlying layers from water ingress and rapid deterioration caused by high traffic volumes and heavy traffic loading. Rural pavements may be unsealed, where traffic loading is lighter.
	**Drainage Facilities** Roading drainage assets include catchpits, sumps and stormwater drainage pipes - connected into reticulated stormwater systems, or draining to ground via soakpits. Culverts under roads are used to preserve land drainage flow paths. The systems drain water away from the road preserving the integrity of pavement layers.
	**Surface Water Channels** In rural situations, drainage assets are typically surface water channels (SWC's) formed within the road corridor. There is increased use of open drains and swales in urban developments. Surface water channels provide the open conduits that are located alongside roads. These channels collect water flows from the road and convey this to other network drainage assets. This asset group includes kerb and channel and dish channels.
	**Street Lighting** Streetlights are provided at intervals along urban roads, footpaths and cycleways, at lighted intersections throughout the District, and at pedestrian crossings to facilitate safe and efficient movement of vehicles, cyclists and pedestrians during hours of darkness. New Zealand Standards apply to street lighting for new development and road improvements. Lights (or lamps) specifications for Selwyn District Council are in accordance with national guidance.

	**Road Signs** Road signs are legal (statutory) notices erected beside the road carriageway to provide advance warning of road hazards, road name or destination information, and regulatory information, such as speed restrictions. Road signs must comply with both national guidance and the legal requirements of the Traffic Control Devices Rule.
	**Pavement Markings** Road (or pavement) markings are the painted lines and symbols on the pavement surface. In some cases the term may also refer to contrasting coloured surfacing – such as green for cycle facilities. They provide delineation, traffic guidance; mark out regulatory zones and demarcation of amenities - such as parking spaces - within the road carriageway.
	**Traffic Controls** Traffic control assets include traffic signal equipment at intersections and road crossings, and structures that guide and regulate the safe movement of traffic. The Selwyn District roading network has an increasing number of traffic signal controlled intersections and pedestrian crossing facilities. This asset group also includes physical traffic islands ("splitter islands" and "build-outs") and some specialised street furniture, such as pedestrian "rest rails" at crossing points. In general, traffic control is delivered to the motorist by traffic signs and markings.
	Rail Level Crossings Selwyn District Council (and Waka Kotahi NZTA) roads within the district include a number of rail level crossings. These provide set points where specialised traffic controls are provided to enable vehicles, cyclists and pedestrians to safely cross operational rail tracks. All assets providing advanced warning and protection to both road and rail users are managed in collaboration with KiwiRail.
	**Footpaths** Footpaths are paths located within the road corridor or council-owned reserves. They are typically for pedestrian use, but may provide an increased level of service, where wider footpaths are shared with bicycles. These will generally be designed to accommodate both modes of movement. They provide a safe area for more vulnerable road users – particularly children, older pedestrians and the mobility-impaired – typically separated from vehicles that use the carriageway. Vehicle crossings at accessways are an exception to this, and are controlled for new development and road improvements.
	**Cycleways** Cycleways are specific paths for cyclists that are used to separate cyclists from vehicle traffic flows. Cycleways are generally located as a space within the road carriageway or shared footpath, delineated by road markings. Dedicated off-road cycleways are increasingly being provided as level of service improvements on the network, and may be classified under the footpath or pavement asset groups.

	**Bridges** Bridges include spanned structures and large culverts that provide continuous roading over waterways, and rolling and mountainous terrain. Underpasses are a specialised culvert structure that allows the safe crossing of livestock under the road. Bridges are complex individual assets and encompass a broad range of construction materials, sub-components and structural performance.
	**Minor Structures** Minor structures assets in Selwyn District are mainly made up of retaining walls, although they may also include supporting structures, such as sign gantries. Retaining walls are provided to support the road, where traffic loads and ground levels cannot be supported by embankments or berms. Some larger retaining walls are complex individual assets and encompass a broad range of construction materials, sub-components and structural performance.
	**Railings** Railings are roadside structures that fence off roadside traffic hazards in order to improve the safety of the network. They include guardrails and handrails (which usually conform to national guidance and specifications) and sightrails.
	**Road Berms/Shoulders (and Vegetation Control)** Road berms are the grassed (or gravelled) land strips within the road reserve that provides an area between the pavement and adjacent property for footpaths, signs, drains, street trees, public utilities and roading structures. These land areas are not typically considered to be assets, and responsibility for their condition may not solely lie with the Council. Vegetation control is a maintenance/operational activity carried-out within the road berm area to control weeds and grass growth, which keeps roadside areas tidy to preserve safety and amenity values.

9.1.4 Asset Group Details

Both the Lifecycle Management sections of this Activity Management Plan, and the Transportation Programme Business Case, follow the same asset group structure. The aim is to enable the Lifecycle Management processes, detailed Lifecycle Management service delivery and the underlying case for investment (set-out in "Part Three – Decision Making, Service Delivery and Benefit Delivery (Continuous Programmes)" of the Programme Business Case)

9.1.4.1 *Sealed Pavements*

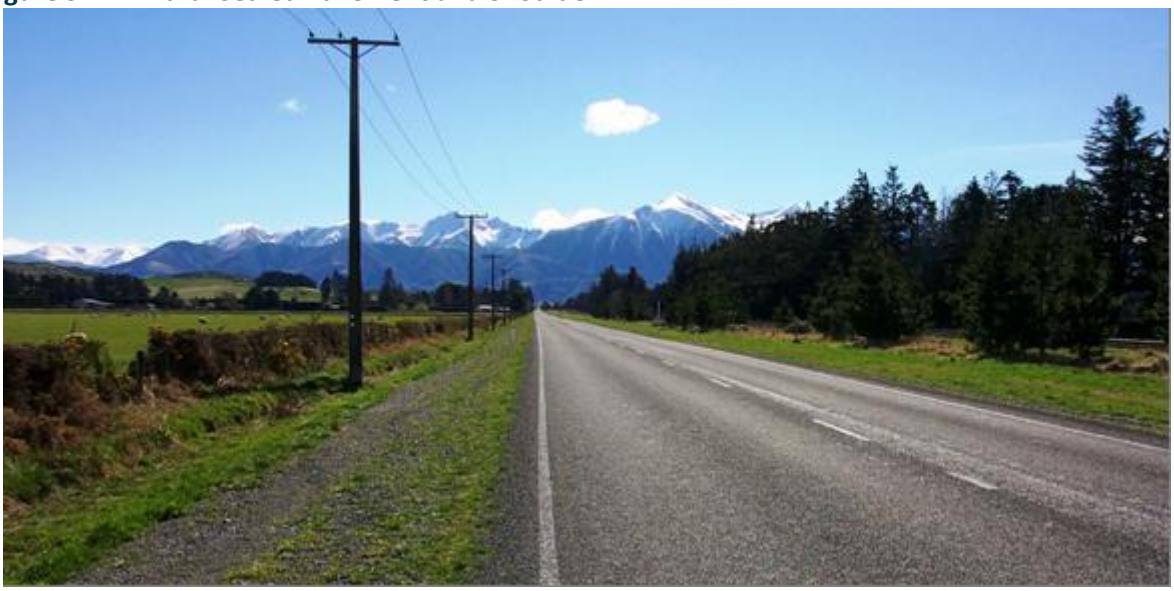
Pavements are the structural and wearing course layers of a road. They are regarded as the core components of the roading network's trafficable carriageways. A major failure of a section of pavement can result in the road becoming dangerous and/or impassable. Based on a total replacement cost of $600 million, the pavements asset equate to 72% of all transport related assets covered by this Plan and is by far the largest single contributing asset group. A small percentage of this replacement value includes the Unsealed Road Pavements (see below).

Headline 9.1:
There are a variety of geological conditions across Selwyn District which affect pavement performance. These conditions are summarised within RAMM as 'Hills', 'Plains' or 'Lake' areas.

The purpose of each road pavement is to provide an element of the network that is:

- Appropriate and suitable for the effective and efficient movement of the vehicles and people using, or likely to use.
- Has a suitable all weather surface that is appropriate to its location and function in terms of skid resistance, noise reduction and smoothness.
- Has a structure suitable to carry legal weight, and most cases over weight, traffic.

Figure 9.1.1: Rural Sealed Pavement and Shoulder



Sealed Pavements consist of four principal components, the sub-grade, sub-base, basecourse and top surface. The composition of these layers differs based on the type, function and locality of the road or street. This is explained further in Section 9b.

The key issues relating to pavement management are:

- Maintenance of an accurate inventory of all pavements.
- Keeping routine maintenance to a level that maintains the integrity of the pavement and overall networks.
- Identifying and investigating sections of pavement in need of rehabilitation.
- Ensuring that all necessary rehabilitation is programmed for funding and physical works.

Current practice is to provide additional strength to a road prior to sealing using a standard 25-year design life. While the variability of conditions throughout the District prevents a blanket approach being taken to the structural design of roads, the costs of sealed road construction are relatively low when compared with those faced by other Road Controlling Authorities nationally. This is because of the good sub-grades and drainage on the Central Canterbury Plains where the majority of the District's roads are located. Sub-grade conditions deteriorate closer to the coast and Te Waihora/Lake Ellesmere and in the hill and high country areas of the District. Disadvantages with the use of a 25-year design life is that this is shorter than the lives experienced elsewhere across the District and therefore, maybe a poor long-term investment.

The most common surfacing used is chip seal, which comprises stone chips embedded in bitumen sprayed onto the basecourse. This surfacing provides the most cost effective and best performing surfacing for thin flexible pavements in the District (i.e. thin pavement layers over sub-grades of a moderate to high strength due to the predominance of alluvial gravels below the Canterbury Plains). It is a very cost effective surfacing due to the availability of high-quality rock from glacial and fluvial stone that can be extracted from rivers or pits, and crushed to the appropriate size. This is the case for almost all rural roads, and many older or Low Volume urban roads.

Based on an average 15 year resealing cycles, many roads will have been sealed around four times since the initial treatment was applied.

Asphaltic Concrete (AC), or concrete paving blocks, have only been used for very specific high-stress sites. Asphaltic Concrete road surfacing comprises an approximately 30mm thick dense layer of mixed bitumen and small stone aggregate applied to the basecourse surfacing. It is known for its smooth black finish and is used predominately in new urban subdivisions for its aesthetic properties. It is also used in high wear and high traffic areas because of its durability.

In the District concrete road surfaces are only found in association with bridge decks and some fords.

Nearly all new urban roads that have come about through recent urban residential subdivision development have an Asphaltic Concrete (AC) surfaces. Council has replaced some chip seals in older

urban streets with an AC seal when a reseal was necessary or when a major street upgrade project was undertaken, particularly at intersections and in turning circles. There is a resident preference for AC seals as these reduce traffic noise and bitumen bleeding in hot weather. They also improve street amenity in line with the streets being constructed by developers as part of new urban subdivisions etc.

While AC has advantages, it is expensive compared to chipseal. Resurfacing AC with chipseal can be problematic, and may be unacceptable to the residents. Currently Council does not have a policy position on vesting roads paved with AC, or what treatment shall be used for resurfacing.

9.1.4.2 *Unsealed Pavements*

In comparison, unsealed roads are quite dynamic in their performance. This is because they require more regular intervention to maintain their surfaces and shapes due to the influences of weather and traffic.

Unsealed Pavements consist of three principal components, the sub-grade, sub-base, and running course surface. The composition of these layers differs based on the type, function and locality of the road or street. This is explained further in Section 9b. The principal maintenance activities on unsealed roads are application of a running course of AP20 metal, which is then re-spread (graded) periodically to maintain an even running surface to vehicles. The running course is generally replenished or renewed in 7-10 year cycles. The rate of metal loss can vary between 5 to 10mm per annum depending on the use and location of the road.

A typical problem with running course is that it is a loose metal that can quickly migrate from the wheel paths, where it is needed the most, to the side of the carriageway under the action of vehicle wheels. While grading does reposition the metal, this constant intervention can be considered inefficient, especially when traffic volumes exceed 150-200 vehicles/day.

When the unsealed roads are considered in terms of ONRC classification, there is one road section that may be a seal extension candidate - Knyvetts Rd a secondary collector, 2.7km between Glasseys Rd and Heslerton Rd. In the 2018 LTP, this section of road is proposed to be sealed in 2033/34.

Unsealed roads where traffic counts indicate ADT of greater than 150 include but not limited to:

ESSENDON RD
FRASERS RD (LAKE REGION)
OLD SOUH RD
PINEGROVE RD
RIVER RD
TANCREDS RD
TWO CHAIN RD

Traditionally unsealed rural roads are identified as potential candidates for seal extensions in respective forward programmes. This work ceased some years ago as it is cost prohibitive and it is Council's policy that these roads have to pass an economic threshold criteria before they can be considered for funding.

Unsealed urban roads are being successively sealed reflecting that these are difficult to maintain and do not provide the level of service expected by residents in the District's townships.

There are a number of unsealed rural roads that serve only one or two properties, or extend beyond the residences on rural properties. Although of a low standard, their very low use is such that they are considered uneconomic to maintain. Council will consider maintaining these roads if they are relatively short and close to other unsealed roads that are regularly maintained. On this basis, Council may elect to provide limited maintenance, reflective of their use and any benefit to the adjoining road network or local destinations. This will require a policy to be developed to identify such areas and the levels of service that will be provided.

9.1.4.3 *Drainage*

Drainage facilities include culverts, sumps and soak holes, grassed surface water channels (swales), and earthen surface water channels on sealed and unsealed roads. Surface Water Channel assets include formed kerb and channel, kerbing without channels and hard surfaced surface water channels in urban areas, such as flat v-channel.

Drainage Culverts

The purpose of culverts is to convey natural watercourses or stormwater across the road without adversely affecting the pavement or surface of the road, or disrupting its use. They are distinguished from bridges by having formed bases in place of the stream bed (water flowing under bridges flows in a natural bed). Standard NZ roading practice, which utilises the definition adopted by Waka Kotahi NZTA for asset classification and investment decision-making, considers "culverts" to have a waterway area less than or equal to 3.41m^2. Culverts larger than this (typically 2.1m diameter, or 2m x 1.75m minimum) are classified as bridges and are often referred to as either "bridge culverts" or "major culverts".

Culverts are generally assets manufactured from are concrete, high-strength plastics or steel. They typically have long useful lives, that show little sign of deterioration until failure, if they have been correctly installed. The exceptions can be:

- Armco® (galvanised steel) culverts carrying peaty or swampy water, which is often quite acidic. In these circumstances, the acidity attacks the galvanising and removes it over a decade or so, leaving an unprotected steel surface shortening the culvert's life.

- Older 'butt jointed' concrete culverts that do not have the modern spigot and socket rubber-ring sealing system between the pipes. Butt jointed pipes can allow water to escape, eroding the surrounding pavement formation. Over time, this can result in subsidence of the carriageway or landslip failures causing sections of road to drop out on slopes.

Surface Water Channels (SWC's)

The primary purpose of all surface water channels (SWC) is to provide a path for stormwater runoff from the carriageway, footpaths, berms, and sometimes the adjacent properties, to:

- Protect the pavement from water ingress, and consequent structural deterioration.

- To allow the convenient and safe movement of pedestrian and vehicular traffic.

These channels are invariably unlined except in very exceptional circumstances where there is a requirement to prevent sub-surface water infiltration / exfiltration or erosion of the channel.

Shallow surface water channels are shallow trafficable depressions formed with the invert 2.0m to 3.0m from the carriageway edge and 150mm to 300mm below the edge of the carriageway. Their sides are tapered back to the existing berm with a target slope of around 1:10. These types of channels are referred to as swales. Deep surface water channels are often referred to as drains.

Both types of surface water channel are predominately found in rural areas. However, the use of swales is becoming more common in urban areas as part of an integrated stormwater treatment and disposal system in new urban subdivisions.

Kerb and Channel

Kerb and channel is a specific type of surface water channel. Its purposes are to:

- Provide a path for stormwater runoff from the carriageway, footpaths, berms and adjacent properties, protecting the pavement from water ingress, and consequential structural deterioration.
- Allow the convenient and safe movement of pedestrian and vehicular traffic.

It also has an important secondary purpose:

- To enhance the convenient and safe movement of pedestrians and traffic by separating these two streams of road users.

Drainage assets account for 9% of the total transportation asset group, based on replacement cost.

The use of concrete kerb and channel, as opposed to surface water channels is a recognised and accepted level of service provided within urban development. With the flat profile of the District's towns, ponding can occur if well-formed channels are not used. Apart from its functional role, kerb and channel also protects the carriageway seal edge from the higher exposure to traffic within the urban area. Kerb and channel is required in all new urban subdivisions by the District Plan. In some of the smaller and more rural orientated townships, kerb and channel may be seen as unnecessary, or not be wanted by the residents.

Kerbing is also installed at some rural intersections, bends and corners in conjunction with other road improvement works, such as minor improvements at intersections, seal extensions and seal widening. Kerbing in these situations protects the edge of seal from edge break problems in these high-wear areas while also providing positive drainage of stormwater runoff. In addition, kerbs delineate corners of an intersection to a higher degree than a plain seal edge. Originally, a number of these proposed installations were subjected to a least life cycle cost analysis before any work was undertaken, with favourable results. These have been taken as typical results and further analysis is not applied unless traffic volumes are marginal or there are other special circumstances.

Figure 9.1.2: Low Profile Kerb and Channel and Entranceway

The key issues relating to kerb and channel are:

- Implementation of a kerb and channel extension strategy that identifies missing sections or sections that need to be provided.
- Determination of the amount of deferred maintenance and renewals of kerbs and channels.
- Utilisation of processes to quantify asset physical attributes and condition.
- Provision of appropriate stormwater collection, treatment and discharge facilities where necessary.
- Compliance with Resource Consent conditions, including under the NRRP conditions, imposed when maintaining, renewing and providing stormwater facilities.
- Resource Consent conditions imposed on developers that will become the Council's responsibility when the assets themselves are vested in the Council by the developers and any resource consents transferred to it.

Recently there has been a move to better understand and manage the environmental impacts of discharges from carriageway drainage systems, especially those that start with open reticulation systems, such as kerb and channel, and include sumps and soak holes. This has been driven in most part by the Canterbury Land and Water Regional Plan (rules 5.93A – 5.97) prepared under the Resource Management Act 1991 by Environment Canterbury (ECan). This Plan puts significant emphasis on ensuring water quality by the correct treatment and disposal of stormwater runoff in urban areas. A large amount of the stormwater runoff is collected by urban kerb and channel and it can contain contaminants like heavy metals and hydrocarbons that originate from the carriageways or the adjacent properties.

Isolated stormwater disposal that does not include reticulation via a reticulated system is permitted provided conditions are met (Rule 5.93).

Storage, treatment and disposal systems are being used in new urban subdivisions to remove or reduce sediments and contaminants before discharge to land and natural watercourses such as rivers. The discharge of stormwater in these situations requires the consent of ECan under the Resource Management Act 1991.

Figure 9.1.3: Treatment Swale — Brookside Road

Drainage Facilities

Sumps and soak holes are used to remove stormwater from kerb and channel or other surface water channels when there is no suitable open watercourse available. Sumps connect to a pipe and usually contain a silt trap. Sometimes this asset sub-group is referred to as "catchpits" as a generalised description. Sumps are generally assets manufactured from concrete, high-strength plastics or steel. They typically have long useful lives, that show little sign of deterioration until failure, if they have been correctly installed.

Where there are no reticulated stormwater systems or natural flow paths, stormwater is often disposed of through soak holes. Soakage facilities (such as soak holes) have a shorter useful life, and also show little sign of deterioration until failure, if they have been correctly installed. These assets have limited scope for maintenance interventions and rely on a more traditional age-based renewal plan.

Soak holes are usually large holes excavated in the berm areas alongside carriageways down to a free draining material (such as the alluvial gravels that are found under the majority of the plains area of the Selwyn District). These holes are then backfilled with single size or GAP-graded (100mm+) stones to create a sub-surface soakage and water dispersal medium. Soak holes are generally very effective throughout the plains areas but away from the confined aquifers near Lake Ellesmere and the coast. Their performance can be unreliable in townships like Lincoln, Prebbleton, Doyleston, Leeston and Southbridge due to soil conditions and/or high ground water tables.

There is a difference between the type of soak holes used in rural areas and those most often used in urban areas. With the water quality requirements detailed in the Land and Water Plan, a considerable emphasis has been placed on enhancing the quality of water runoff from roads and streets, before it discharges into the ground and in time infiltrates the water aquifers.

1. Standard soak holes receive run-off directly from surface water channels, usually swales. Their dispersal medium (the stone filling) usually extents to the ground surface where it is finished flush with the surface. In rural areas carriageway drainage is purely a roading responsibility as there is little threat to subsurface water quality from any carriageway runoff, due to the inherent treatment that occurs with the swales and open surface water channels commonly present.
2. Soak holes used in urban areas are referred to as modified soak holes. They receive discharges from the sumps located in the kerb and channel and are generally located in the berm behind the kerb in line and adjacent to the sump. Modified soak holes utilise a central perforated 300mm diameter pipe core and a debris trap that sumps discharge to, surrounded by a stone dispersal medium. Unlike ordinary soak holes, they eliminate the need for the large stones to be on the surface of the berm, which is more in keeping with higher amenity urban areas.

   The design of urban sumps has changed in recent times, to improve the trapping of sediments and contaminants.This has required the use of submerged outlets and other techniques before discharging to other treatment and disposal systems like swales, soakage basins and wetlands alongside the carriageway. The operation and maintenance of soak holes in urban areas is now seen as part of the Utility Stormwater asset because of the specific operational and maintenance requirements to maintain water quality standards.

Most drainage facility assets – such as sumps and chambers - are concrete, high-strength plastics or steel, with long useful lives.

With appropriate maintenance the asset lives may be longer than assumed. It is quite likely that replacements will be associated with a change of level of service or demand only. Appropriate maintenance is regarded as key.

9.1.4.4 *Network Services - Street Lighting*

Streetlights were previously part of the “Traffic Services” asset group. They are made up of the following components, or sub-groups:

- Lights
- Brackets
- Poles (excluding utility services poles)

The purpose of street lighting is:

- To provide agreed lighting levels in streets for the safe and efficient movement of vehicles, cyclists and pedestrians.

Streetlights are provided for a variety of reasons. These range from lights installed at specific rural intersections to improve road safety, lighting of residential and rural residential streets and roads, and the lighting of pedestrian footpaths and cycleways through township reserves that connect between streets.

Council manages streetlight assets located on District roads, as well as those located on State Highways, which are managed under delegated authority from Waka Kotahi NZTA.

With encouragement from Waka Kotahi NZTA, providing an enhanced Financial Assistance Rate of 85% subsidy, Council opted to replace the lighting assets with energy efficient LEDs. This programme has been delivered over the course of the 2018-21 Long Term Plan period for the entire District, and is due to be completed in June 2021. This whole-of-network upgrade now requires the Council to review it's asset management practices in relation to street lighting, to ensure best value is obtained in maintaining and operating the LED lights and planning for future renewals. Street lighting assets account for 3% of the total transportation asset group based on replacement cost.

Figure 9.1.4: Double Arm Street Lights, Izone Drive

Historically street lights have been mounted on other utility poles, such as power poles. However, over the last 20 years new urban subdivisions have been required to have underground power and telecommunications services. This then requires street lights to be mounted on their own poles. The developers who construct these subdivisions often utilise decorative light fittings and poles to enhance the streetscape. The installations that are then subsequently vested in Council can have a corresponding higher maintenance and renewal needs and demands.

In the past, street lights were installed by the local "power board" with little or no involvement from Council. These lights were installed to standards applying at the time of installation. Subsequent revisions in standards and community expectations have meant that in some areas the level of service provided is below what would is currently expected. In some cases, residents of the smaller more rural townships in the District prefer to have little to no street lighting — which is more in keeping with the rural environment.

Council has adopted the AS/NZS 1158:2010 Street Lighting Series of Standards. These set out requirements for lighting systems for roads and other outdoor public areas, primarily to provide a safe and comfortable visual environment for both vehicular and pedestrian movement at night.

The LED Upgrade programme has replaced streetlighting on a 'like for like' basis only. Whilst lighting performance is often improved by current LED technology, they cannot completely address gaps in expected service levels.

The key issues relating to the management of street lighting are:

- Lighting standards that reflect the intended use and road hierarchy.
- Identifying opportunities for optimising street lighting maintenance and operations, and the need for a development of a street lighting renewal and upgrade programme, following the completion of the LED Upgrade programme.
- The effect of decorative urban street lights vested in the Council, by urban subdivision developers, on renewals and maintenance budgets.
- The impacts of any future undergrounding programmes for overhead wiring.

9.1.4.5 *Network Services - Road Signs and Pavement Markings*

Road signs and pavement markings were previously part of the "Traffic Services" asset group. which aid the safe and orderly movement of traffic and indicate road use restrictions and other information. A good standard of signs and markings can contribute significantly to a safer road network.

Council has over 18,200 signs, 1,300 kilometres of road line marking (, and 2,600 individual pavement markings. The lifecycle management of pavement markings is considered to be a maintenance and operational activity, and are not directly considered to be assets. Road sign assets account for 1% of the total transportation asset group based on replacement cost. Unlike streetlights, where poles are separately managed as an asset sub-group, sign posts are considered to be part of the sign components. Both signs and posts have similar in-service lives.

Figure 9.1.5: Birchs Road Delineation Upgrade

The use and design of many traffic services assets is controlled by statute. The current statutory regulation controlling them is Land Transport Rule: Traffic Control Devices 2004, Rule 54002. These regulations typically set the level of service standard in urban areas. The standard of rural delineation provided over the network has previously reflected that used by Christchurch City Council for the outskirts of Christchurch, where it borders the Selwyn District. The adoption of Council policies in the early 2000's require that markings are provided to present a seamless transition into the Selwyn District from all neighbouring districts.

The key issues relating to road signs and pavement markings are:

- Establishing economic and meaningful performance measures for signs and markings.
- Providing a consistent appropriate standard of signage on all roads in the district, relative to their hierarchy and use.
- Damage caused to signs by vandalism and traffic accidents.
- The quality of road marking materials and application.
- Problems with markings adhering to fouled surfaces.
- Maintaining road markings in areas of high wear.
- Providing a consistent appropriate standard of road marking on all roads in the District, relative to their hierarchy and use.

9.1.4.6 *Network Services - Traffic Signals*

The growth in urban roads and the associated traffic control assets – principally traffic signal upgrades at key intersections - places an immediate burden on network services maintenance budgets. Where budgets and resource are constrained, work in urban areas is likely to be prioritised.

As the traffic signals located on Selwyn District Council roads are all new assets, they are generally in good condition. There are no known recurring problems caused by inadequate maintenance for these asset classes. Reactive maintenance to repair damage or faults at traffic signals require urgent response, placing additional pressures on already constrained resources. No significant renewal requirements are currently anticipated for the next ten years.

9.1.4.7 *Footpaths and Cycleways*

The primary purpose of footpaths is to provide safe and convenient facilities allowing people to walk to their chosen destinations. Cycleways have an analogous purpose. It is becoming more common to provide shared facilities utilising pathways that are wider than what would normally be provided.
The footpath and cycleway assets account for 7% of the total transportation asset group based on replacement cost.

For the purposes of this section of the Plan, cycleways are separate facilities that are not part of the carriageway. On-carriageway facilities such as cycle lanes are considered part of the pavement asset sub-group and are managed accordingly as an integral part of the pavement.

Footpaths are mainly located along streets and roads in townships and through reserves and other areas connecting culs-de-sac and other streets to enable increased connectivity. Footpaths are not normally found in rural-residential subdivisions as current Council policy does not require them to be provided.

Figure 9.1.6: "Mayoral Challenge" Cyclists on Birches Road Rail Trail, 2008

In some cases formed pathways can link townships, for example between Waddington and Sheffield and the "Railtrail" from Christchurch to Prebbleton and Prebbleton to Lincoln. The section of formed and sealed pathway alongside Birchs Road between Prebbleton and Lincoln is 7km long and is used by pedestrians and cyclists.

Council adopted a Walking and Cycling Strategy and Action Plan in 2007. This Strategy is undergoing a refresh and is available in the Appendix. While the Strategy is a separate document to this Activity Management Plan, implementation of the Strategy is achieved through this AMP. The Walking and Cycling Action Plan is discussed in Section 3.6.3.

Council's current policy is to have footpaths on only one side of the road in new developments and in townships. There may be exceptions considered on a case-by-case basis in high usage areas, such as near businesses and schools. One of the steps in implementing the draft Walking and Cycling Strategy is to review this policy.

The key issues relating to footpath and cycleway management are:

- Implementation of the revised Walking and Cycling Strategy.
- Controlling third party damage to footpaths (e.g. building sites, trucks).
- Deferred footpath renewals.
- The effects of utility companies' underground wiring for maintenance and renewals programmes.
- The increasing emphasis being placed by government agencies to promote and provide more sustainable transport options that utilise walking and cycling and the provision of infrastructure to enable this.
- Footpath crossfalls, "missing" sections of footpath and other facilities such as drop crossings to cater for mobility scooters and other vulnerable road user groups.

The type of surface used is dependent on life cycle cost considerations, pedestrian volumes and the amenity value of the location e.g. shopping and ommercial areas. It has historically been influenced by the preference of the local township committee, which is now likely to form a secondary consideration with the inclusion of footpath and cycleway maintenance, operations and renewals under Waka Kotahi NZTA Work Categories, eligible for financial assistance. Surfacing currently constructed for footpath and cycleway assets in the Selwyn District includes:

- Asphaltic Concrete: Mix of graded aggregate and asphaltic binder laid in a 20–30 mm layer, over compacted basecourse.
- Chip seal: Layer of sprayed bitumen with a small-grade stone chip, spread over compacted basecourse.
- Concrete: Unreinforced concrete laid in a 75 mm layer over compacted basecourse.
- Paved: Concrete pavers laid over compacted basecourse.
- Metal: Graded crushed stone chips spread over compacted basecourse.
- Interlocking Blocks: Concrete blockwork (usually coloured) or vitrified clay bricks, laid side by side on a formed and compacted base in an interlocking pattern to form the footpath surface.

All footpaths and cycleways are constructed over a prepared base layer, which varies to suit the underlying ground conditions and other factors such as the locations of vehicle crossings.

Much of the network is less than 20 years old There is currently no deferred maintenance, and the District footpath programme is considered to be in 'build mode', funded from Capital Improvements investment. There is limited renewal undertaken as part of maintenance. Over the next three years it is proposed that data will be improved as part of condition rating (and inventory improvement) to develop an indicative renewal plan. Annual Depreciation is significant at $1,672,294 (2020 valuation) based on the rapid growth of these assets and shorter standard lives compared to pavements.

9.1.4.8 *Bridges*

The purpose of road bridges is:

- To provide continuous all weather access over rivers, streams and uneven terrain, and grade separation over railway lines and other roads.

As discussed in Section 9.1.4.3 "Drainage – Culverts", the bridges on the Selwyn District Council roading network structures such as major culverts if they have a waterway area greater than 3.41m^2.

The bridge inventory reviewed in 2019-20 comprises of 139 structures. Bridge assets account for 8% of the total transportation asset group based on replacement cost.

There are four bridges that straddle the District's boundaries. Two of these, over the Rakaia River, are State Highway bridges and Council has no responsibility for them. Responsibility for the others is shared as follows:

Table 9.1.1: Shared Bridges Partly Owned by the Selwyn District

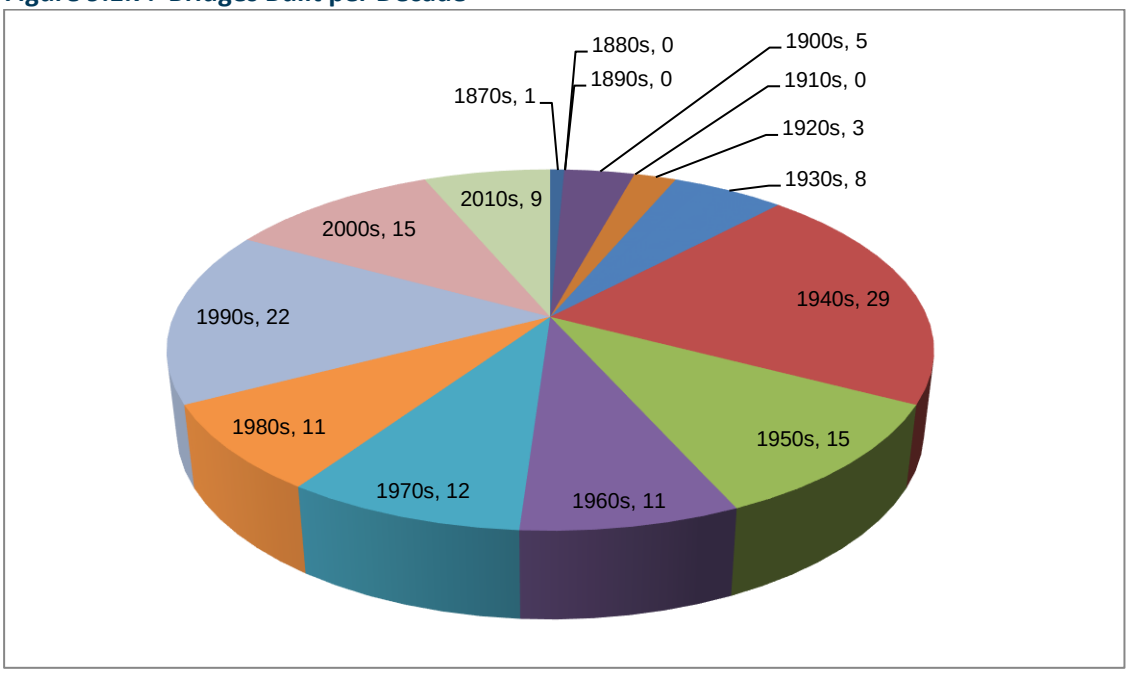
Bridge	Ownership	Management Responsibility
Waimakariri Gorge Bridge, Waimakariri Gorge Road	50% Selwyn District Council 50% Waimakariri District Council	Selwyn District Council
		
Knights Stream Bridge, Trices Road / Sabys Road (CCC)	50% Selwyn District Council 50% Christchurch City Council	Christchurch City Council

Bridges are complex assets with specific issues. The majority of Council's road bridges are located in two distinct geographic areas in the District, the Hill Country between Springfield and Hororata and in the Plains area between Prebbleton and Leeston.

Bridges and culverts in the Hill and High country are over natural streams and rivers originating from the catchments in this area, and over open-channel formed stock-water race systems. There are some bridges located in the High Country that provide tourism, recreational and farm station access. Bridges and culverts in the plains area serve the continuation and tributaries of the main rivers originating from Hill and High Country, and formed open-channel land drainage systems.

Council's bridge stock ranges in age from almost 150 years-old (the Poulter River Bridge, Mt White Road - constructed in the 1870's) to less than 10 years-old. A high proportion of bridges attributed with a construction date in the 1940's is a result of this being used as a general default when age may not have been accurately established. Most original bridges over the larger rivers were replaced with modern concrete and steel structures between the 1950's and the 1990's.

Figure 9.1.7: Bridges Built per Decade



Bridges are constructed from various materials including timber, steel and concrete. As the District roading network expanded smaller bridges were made of timber. As time progressed larger bridges were made of steel, composite structures of both timber and steel were also constructed.

Figure 9.1.8: Poulter River Bridge – Mt White Road

The majority of older bridges are constructed of timber and are relatively short in length, being over small natural and formed watercourses. These bridges receive the majority of routine maintenance attention. Typically, timber was used for decks and steel for the superstructure. Piles utilised either material. This has created some difficulty with the long-term maintenance of bridge structures, as the different materials age and deteriorate at different rates. Timber, including Australian hardwood that was the early material of choice for most bridges, is the least durable of all the materials available and is prone to rot, insect attack and natural defects such as cracking, splitting and in the case of timber decks, surface abrasion. Steel is more durable but is subject to rust and consequently must be well protected by surface coatings to prevent deterioration.

Nearly all bridges are now constructed from concrete, utilising high quality precast components. Smaller timber bridges are being replaced with precast box culverts that can be quickly put into position. Concrete structures while potentially the most durable can suffer from carbonation and chloride attack, which can allow internal reinforcing steel to rust or concrete to degrade. Poor or inappropriate structural detailing and construction of concrete structures can significantly influence their longevity and the potential for expensive rehabilitation work during the life of the structure. This is more prevalent in older structures where these types of defects have become evident by the passage of time.

Larger culverts generally serve water races and land drainage systems and are typically concrete structures of varying quality and condition, depending on their age.

Key issues relating to the management of road bridges are:

- Older timber bridges reaching the ends of their practical and serviceable life spans.
- Higher demands on older bridges from heavier and more traffic than originally anticipated when built. Forestry, dairy, and stock transport now typically operate at 46-50 tonnes loaded mass, compared with 16-20 tonnes 40 years ago.
- Increasing number of requests for access by HPMV (some over 50 tonnes mass).
- Maintenance liabilities with some types of older bridges, caused by obsolete detailing and construction methods.
- Increasing awareness of safety related issues with older bridges, e.g. single lane, inadequate approaches, guardrailing.
- Striking the correct engineering and social balance between an appropriate level of service and cost, e.g. bridge replacements or refurbishments.
- Obtaining financial assistance (subsidy) for replacements or new bridges.
- Obtaining resource consent for major works in or adjacent to watercourses under the Resource Management Act.

9.1.4.9 *Railings and Minor Structures*

Railings are a very small asset grouping within the transportation assets, with just over 5,000 metres of railings and supporting structure recorded.

9.1.4.10 *Passenger Transport*

Passenger Transport is historically provided to Selwyn District through Environment Canterbury (ECan) Regional Transport Committee. While being involved in planning and decision making for public transport across the district and the Greater Christchurch region, Selwyn District Council's role has historically included the provision of bus shelters at specific bus stops.

Capital expenditure for new and upgraded bus stops has been funded from the Capital Improvements budget – or Council's unsubsidised capital programme – prior to the 2018-2021 NLTP. Repairs and restoration have been undertaken under the Road Maintenance Contract when required.
There is an annual pedestrian infrastructure budget of $. This is used for the upgrade of pedestrian infrastructure throughout the District. The decision to fund an upgrade to pedestrian infrastructure is influenced by criteria like safety, patronage and whether the improvement has been requested by the community. Recently this budget has been used to purchase bus stops and create sealed shoulders for buses to pull over onto instead of stopping in the middle of the road to let on/off passengers.

9.2 Asset Life Cycle Management and Service Delivery

The management of roading and transport is a 'significant activity' under the terms of the Local Government Act 2002. Council has a statutory obligation to provide an effective and efficient transport system, including aligning it to the purpose and objectives of the Land Transport Management Act 2003. Selwyn District Council organisational objectives - and outcomes sought through delivering the Coucnil's transportation activity - are then linked back to these statutory objectives.

To achieve the desired outcomes, it is essential that Council manages the activity, both at a detailed and a network level. Ensuring that best practice life cycle management for transportation assets is embedded in Council's activity management ensures that Selwyn District Council can effectively and efficiently deliver a local road and transport network as part of a wider integrated regional and national transport system.

Council does not work alone in meeting the District's transportation needs. It works with a wider group of Road Controlling Authorities, Waka Kotahi NZ Transport Agency, advocacy groups (such as Local Government New Zealand and the Road Efficiency Group), industry and professional bodies (for example, the Institute of Public Works Engineers Australasia), and specialist service providers to plan local and regional transportation networks.
There are also other stakeholder organisations that have an interest in transport matters. These include freight transport, motorist, walking and cycling, public health, disability and mobility and road safety groups. Their involvement adds value and a different perspective which improves transport planning and decision-making processes.

Procurement Strategy

Services are delivered using in-house or out-sourced resources as described in the approved Procurement Strategy (refer Section 3.6.5).

Collaboration

Selwyn District Council is actively involved in collaboration efforts to manage it's transportation assets as part of the regional (greater Christchurch) area. There is a considerable level of joint planning undertaken. There is also contact with neighbouring authorities through Regional Land Transport and Waka Kotahi NZTA initiatives.

The Selwyn network is large and there is an appropriate level of staffing and resources available to manage this. The physical works contract is both a manageable and competitive size, and there are arrangements in place to secure professional services where required to complement the in-house team. These elements ensure effective and efficient delivery of transportation operations, the maintenance and renewals programme and Council's capital works programme. There are currently no reasons or intent to seek a collaborative arrangement with another organisation.

Headline 9.2:
Physical works have been outsourced since the 1990s as a Waka Kotahi NZTA (previously Transfund) requirement.
Council undertakes most planning and supervision activities in-house

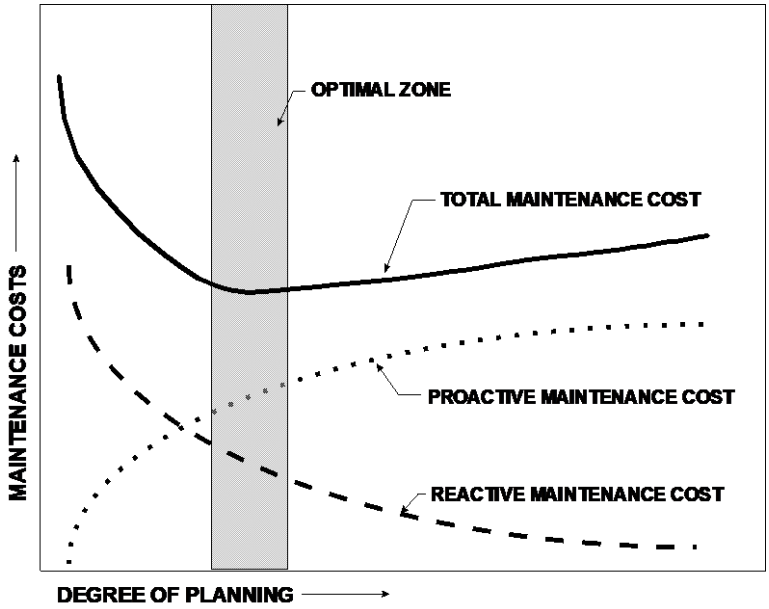
9.3 Maintenance and Operations Plan

9.3.1 Maintenance and Operations Overview

This section describes how Council will manage and maintain the established levels of service on the transportation network. The plan also includes assessment of the costs of the maintenance, operations and renewal activities required to deliver services at these expected levels . It also covers these aspects in relation to operating and maintaining the service capacity, condition and life cycle performance of the transportation assets.

A key element of asset management planning is determining the most cost efficient programmes of planned and unplanned maintenance, as illustrated below:

Figure 9.3: Balancing Proactive and Reactive Maintenance



Council sets its funding for road operations and maintenance every three years through its Long Term Plan (LTP). From 2009, the Land Transport Management Act has required Road Controlling Authorities to prepare and submit their three-year Land Transport Programmes for approval as part of the Environment Canterbury Regional Land Transport Programme (RLTP) under Activity Class 8 – Maintenance and Operations. This is then incorporated into the National Land Transport Programme (NLTP). This encompasses Waka Kotahi NZTA Work Categories 111 to 151, as shown in Table 9.1.

Table 9.1 – Waka Kotahi NZ Transport Agency Maintenance Work Category Structure

Work Category	Work Category Name
	Maintenance and Operations of Local Roads
111	Sealed pavement maintenance
112	Unsealed pavement maintenance
113	Routine drainage maintenance
114	Structures maintenance
121	Environmental maintenance
122	Traffic services maintenance
123	Operational traffic management

124	Cycle path maintenance
125	Footpath maintenance
131	Level crossing warning devices
140	Minor Events
141	Emergency reinstatement
151	Network and asset management
171	Financial grants

Council also undertakes some works of this type without Waka Kotahi NZTA financial assistance. Historically, road maintenance has been seen by many Local Authorities as an area where savings can be made when there is pressure to reduce rates. The maintenance activity is a large budget item, and is still seen by some as one where reduced investment has less of an overall impact. The Council recognises that such decisions are rarely in the best long term interests of the roading network.

In general, funding of maintenance is set to match the long-term needs established by the maintenance programmes set out in this Activity Management Plan. In preparing Council's 2021-2031 Transportation Activity Management Plan, a business case approach has been used to demonstrate how the maintenance, operations and renewals 'Continuous' programmes put forward by Selwyn District Council represents best value to Waka Kotahi NZTA as co-funder. One significant change introduced during the 2018-21 NLTP period was the inclusion of footpath maintenance work as a financially assisted Work Category.

While the timings of these programmes have been established to coincide with Local Government statutory long term planning processes, there can be delays in NLTP approval, which may not be completed until after the start of each three-year LTP financial period.

Maintenance and maintenance tasks are not carried out in isolation from other activities on the network. Maintenance approaches are optimised on a whole of life basis and when maintenance ceases to be viable, renewal usually becomes economic.

Maintenance activities are also integrated with the long-term needs of associated asset elements, e.g. there are more extensive pavement repairs carried out immediately before a reseal to ensure that the surface life is prolonged to the greatest practical extent.

9.3.2 Maintenance Activities

Maintenance activities are the day-to-day works needed to keep assets operating at the required service levels. These activities are often referred to as "routine maintenance". Routine maintenance falls into two broad categories as follows:

1 **Planned (Proactive) Maintenance:** Proactive inspection and maintenance works planned to prevent asset failure.
2 **Unplanned (Reactive) Maintenance:** Reactive action to correct asset malfunctions and failures on an as required basis (i.e. urgent repairs).

The following table details the principal maintenance regimes for the various asset categories.

Table 9.10 10: Maintenance Types and Asset Categories

Asset Category		Principal Type of Maintenance
Roads	Road pavements	Preventative and Reactive
	Footpaths and cycleways	Reactive
Drainage	Culverts	Preventative
	Kerb and Channel	Preventative and Reactive
	Catchpits	Reactive
Structures	Bridges, Retaining/Protection Structures	Preventative
Safety Facilities	Road Markings	Preventative
	Guardrails, sight rails, etc	Preventative and Reactive
	Street lights	Preventative and Reactive

9.3.3 Operations

Asset operations are activities that have no effect on asset condition but are necessary to keep the asset appropriately utilised. This distinguishes them from maintenance activities, which directly affect asset condition. In this section operational costs such as street light power, are included in the sections and discussions associated with the maintenance of those specific assets, while professional services and similar costs, are discussed in the Operations section.

This section of the Life Cycle Plan covers asset operational activities and costs associated with:

- Professional services.
- Asset management systems.
- Related staff and overheads.

Asset management operations involve the timely and professional input of engineering knowledge and the use of asset management systems to ensure best-value in planning and delivering works, including renewals programmes.

Professional services, beyond feasibility study level, for most renewals and new improvements works are regarded as project-related and form part of the overall cost of those projects.

Professional Services Overview

The Council has in house resources responsible for the operation of Council's Transport and township activities. Time recovery and overhead costs associated with the unit are charged to the various Council accounts that span the various maintenance, renewal and improvement activities, including where eligible the subsidised NZTA work categories through Councils Land Transport Programme.

There is no cost component associated with "profit" as there is no Council requirement for this to be generated. Council has focused the Unit's energy and direction on providing a good service, compared

to the need to make a profit. The cost of strategic transport planning staff is recovered from District-wide overheads as this work is spread out over the complete activity to the benefit of all ratepayers and residents.

In 2006 Council decided to create two separate, but intrinsically related, engineering units within Council. The Service Delivery Unit is responsible for the day-to-day operational engineering management of Council's activities. The Strategic Assets Unit is responsible for providing strategic long term planning functions, such as the preparation of the Activity Management Plans, input into the LTP, and coordination with long term regional planning initiatives such as the UDS. Both units' activities are coordinated by the Asset Manager.

Refer also to section 10.1.8 Organisational Structure.

Professional Services Costs - Maintenance, Renewal and New Improvements Fees
How professional services costs are provided and allocated to subsidised roading works are strongly influenced by Waka Kotahi NZTA policies and procedures. Generally professional services costs provides for the service fees relating to maintenance and operations.

Operational fees include the professional services necessary to:

- Manage a roading network, including all maintenance activities.
- Prepare contracts for the works and services needed to deliver the agreed levels of service.
- Legalise existing road reserves.
- Produce project feasibility report (PFRs) for capital projects.
- Investigate rehabilitation.
- Manage preventative maintenance.

NZTA Work Category 151 – Network and Asset Management under Council's subsidised Land transport Programme is where funding is sourced for professional services for Activity Classes 8 – Maintenance and Operations of Local Roads and 10 – Renewal of Local Roads. This category does not include operational traffic management and emergency reinstatements.

For the other main activity classes associated with Council's subsidised Land Transport Programme 1 – Road to Zero (Safety Improvements), 4 – Walking and Cycling Improvements, and 12 – New and Improved Infrastructure for Local Roads, professional services costs form part of the individual work category budgets that fall under these categories.

Financial forecasts contained in this plan reflect this and as such, these services are not itemised separately.

Internal professional services costs have previously been calculated based on six Full Time Equivalent (FTE) positions relating to subsidised transport activities conducted under the Council's Land Transport Programme. The Improvement Plan includes a task to ascertain if this needs to increase in order to manage the activity properly over the forecast period of this plan.

Professional services costs are incurred by the Council's Transportation Strategic Asset Management and Service Delivery teams, and any external consultants the Council engaged. In broad terms, all are subsidisable provided the works themselves are subsidisable. For example, fees related to footpaths are not subsidisable as footpath works generally are not currently subsidisable. This may change based on the new government's direction.

Costs associated with preparing, updating and administering this Activity Management Plan are covered under NZTA Work Category 003 – Activity Management Plans.

A new Work category 004 is for Programme Business Case development. This work category provides for the preparation of transportation Programme Business Cases, including supporting evidence collection and model application. Waka Kotahi NZTA expects that proposals for funding assistance for a Programme Business Case will be justified using a fit for purpose Strategic Case which:

- Outlines the case for change and the need for the potential investment.
- Identifies the strategic context and fit of the proposed investment.
- Provides stakeholders with a high degree of confidence that the investment aligns with strategic priorities.

Selwyn District Council has developed both the Strategic Case and Programme Business Case for Transportation activities as part of the funding

Professional services costs for non-subsidised activities are fully funded by the Council, including professional and system costs for all unsubsidised maintenance, renewal or improvement works. These costs are reflected in the financial forecasts in Section 11 – Financial Summary of this Plan.

9.3.4 Monitoring, Quality Assurance and Supervision

The Council is vigilant in monitoring the performance of the Contractors and Consultants to ensure that the performance standards defined in contracts are continually achieved. Contract No. 1234 Road Maintenance includes specific network surveillance and condition monitoring as part of the overall network monitoring programme.

Monitoring

The following table lists the main asset and condition monitoring systems in place for the major asset groups. This approach is under ongoing review as asset data requirements for dTIMS and business case evidence increase.

Table 9.10 11: Network Asset and Condition Monitoring

Asset Category		Monitoring
Roads	Road Pavement	**Network Inspection:** Inspections by road maintenance contractor ranging from monthly to 12 monthly based on road type. Daily monitoring by Council Roading staff. **RAMM Rating:** Whole sealed network once every three years. Pavement Use 1 and 2, 200m rating length with 10% inspection. Pavement Use >2, 200m rating length with 10% inspection. Note following publication of Amendment 1 to The NZ Transport. Agency's Programme and Funding Manual RAMM rating is now carried out as follows: All sealed roads carrying >= 500 veh/day — rated and annually. 50% of the remaining sealed local road network rated annually so that all are rated once every two years. **RAMM Roughness:** The roughness of all sealed roads per lane is measured once every three years in conjunction with RAMM rating. All unsealed roads (one direction only) once every three years to the following criteria excluding any: Unsealed roads or carriageway sections less than 500m long, e.g. small no exit unsealed roads. Unsealed urban roads. Any unformed or unmaintained sections. Unsealed carriageway sections less than 4m wide. Unsealed carriageway sections with a traffic count less than 20 ADT.
	Footpaths	Annual inspection of 100% of network by roading staff and contractor. RAMM Condition rating of 100% of Network 2-4 year intervals.
Drainage	Culverts	No formal Inspection. Improvement Plan task noted previously to introduce a formal rating system.
	Kerb and Channel	Periodic inspection of 100% of network. RAMM Condition rating of 100% of Network 2-4 year intervals
	Sumps etc.	As part of cyclic cleaning programmes.
Structures	Bridges, Retaining/ Protection Structures	Routine visual inspections included in network inspection. Detailed inspection every 12 months, and during and after flood and earthquake events, by contractor. Consultant inspection – frequency informed by criticality.

Asset Category		Monitoring
Safety Facilities	Road Markings	Part of Performance Contract requirements.
	Signs, guardrails, sight rails, etc.	Included in network inspection.
	Street Lights	As part of lamp bulk change programme, and 6 monthly night inspections on strategic routes including local roads and state highways.
	General	Safety audit: There is no specific audit. This is noted as an Improvement Plan Task both in this plan and the SMS plan to establish a routine safety audit procedure over the network. Review of all fatal and serious crashes, and crash information sources.

Supervision

Regular auditing of Contractors and Consultant performances is undertaken to ensure performance measures are being met (as detailed earlier in this Section of the Plan). Council audits Contractors' performance by measurement and inspection of the work and of the roading assets.

Council employs two road contract supervisors who undertake monitoring of the performance of the network and directly supervise contractors. They provide an important conduit between the contractor and the engineer in the identification and resolution of any problems or issues as they occur.

Council's contract supervisors have frequent contact with Contractors. They:

- Keep informed of where the work is being done.
- Inspect work on an appropriate basis resolving any issues on site.
- Report to the Engineer on the work being done.
- Confirm approved work to the Contractor.
- Clarify contract issues.
- Have a crucial role in developing and maintaining the partnering approach and relationships essential to the successful management of long-term contracts, e.g. the road maintenance contract.

There are many items of work that are done on a cyclic basis, e.g. kerb and channel cleaning, pothole patching, and mowing; where the location of the work varies from hour to hour. This type of work is observed only if a supervisor is in the area at the time. The quality of completed work is noted as part of the general inspection on District roads.

Poor workmanship is noted and referred to the Contractor for fixing.

Daily contact with the Contractors and frequent inspection of the work sites by the contract supervisors ensure that both the Contractor and the Engineer are aware of the work being done and the specified standard is being achieved.

Quality Assurance

All main contractors are required to submit for approval a Quality Assurance Plan(s) prior to commencement of the contract that establishes standard and specific quality procedures relevant to the work being conducted. This is particularly relevant for the main on-going road maintenance, road marking and resealing contracts where ISO 90001 accreditation is the minimum standard required.

9.3.5 Corporate Operations

The term Corporate Operations is used in this context to include all matters associated with running and funding the road network that are neither carried out by roading staff nor fit comfortably into any of the other categories discussed in this Plan or its Appendices, but that are charged or credited to the roading accounts.

Council's policy is for the costs of running the following aspects of the organisation to be met from activity budgets as an overhead:

- HR and payroll services.
- Policy and communications unit.
- Financial services, including accounting, budgeting, creditor payments and revenue collection
- Information systems.
- Other corporate administration costs.

Corporate overheads are allocated to activities based an assessment of the workload generated by the activity.

9.3.6 Asset Management and Service Delivery

The cost of the Service Delivery Division, including staff costs and divisional overheads, is allocated to the relevant activities based on assessment of the workload generated by each activity.

Asset Performance Data

There is an extensive range of data collected to monitor the condition and performance of transportation assets. Monitoring is discussed in Section 9.105.4 and in Section 6 of this AMP.

Any deficiencies identified have been noted as improvement items in the respective sections.

Asset Management Systems Costs

The Asset Management Systems employed by Council on its transportation assets are described more fully in Section 11 of this Activity Management Plan. These are also funded under NZTA Work Category 151.

This Section of the Life Cycle Management Plan covers the professional services relating to the operation and administration of Council's transport Asset Management Information Systems (AMIS's). It is placed here so that all the operational expenditure-related aspects of roading are in one part of this Plan.

The systems and services that are funded provide inventory, rating and assessment information relating to:

- Traffic features.
- Road condition.
- Road Features.
- Age.
- Design lives.
- Costs.
- History.

The principal asset management system used is the RAMM system, which is the main repository for all Council's roading asset inventory and condition rating information.

The SLIM database within RAMM contains similar inventory and condition history of street lights. Its cost is included as part of its overall activity costs as it is directly managed as part of the Street Light Maintenance contract.

Asset Performance

This system, combined with integrated predicted deterioration modelling programs such as dTIMS and asset valuation modules, provides the asset information to produce this plan, maintain and operate the network and manage the planned renewals investment.

9.4 Approach for Managing Services Delivery Risks

9.4.1 Risks Associated with External Providers

Contractual Difficulties or Failure

While the tension between the parties of a well-run contract is healthy, major contractual difficulties can have significant adverse effects on the Council's ability to deliver its agreed levels of service. These risks are managed by:

- Using industry-standard forms of contract wherever practical.
- Appropriately qualified and experienced senior staff reviewing draft contract documents before tenders are advertised.
- Close liaison with contractors.
- Management of long-term period contracts in a partnering environment.
- Holding regular meetings with individual contractors at which difficulties can be resolved before they become problems.
- Checking contract claims quickly and paying authorised claims quickly.
- Attempting to understand the contractors' businesses and the pressures on them.

Contractor Skill Deficiencies

- Council's contract evaluation procedures include assessment of the contractors' ability to perform the required works or services to the required standards. On long-term contracts, the depth of key skills in contracting organisations is also considered.

Response

Response times are detailed in the various maintenance contracts. Council maintains a 24-hr / 7-day call centre that is able to contact key staff and contractors in the event of emergencies.

9.4.2 Internal Risk that May Impact of Service Delivery

Staff Continuity

The effects loss of key staff, with key knowledge, requires constant management. Council recognises that all staff will eventually leave its service and the importance of continuous capture of knowledge and its transmission to others. This Activity Management Plan is a small part of that process.

Succession planning within any business is considered necessary to reduce the risk associated with staff leaving the organisation and forms part of the business continuity process. Succession planning allows institutional knowledge to be passed on, and assists in ensuring continuity of organisational culture. To this end the Transportation AMP is quite detailed to ensure all relevant documents and information required for appropriate decision making are recorded and knowledge transfer can occur even in the absence of key staff.

Staff retention may become a key issue due to technical/professional requirements for the rebuild of Christchurch over the next few years. A methodology for managing this risk has yet to be resolved formally but the following steps have been implemented in the interim:

- Regular reviews of pay parity.
- Management of individual professional development.
- Work enjoyment and flexibility.
- Management of individual workloads.

In June 2014 an additional Transportation Asset Planner was employed to assist with strategic management of the network. In addition, long term relationship with Consultants means there is some broadening of their knowledge and capability base within Transportation Planning.

Staff Skill Deficiencies
Council recognises that its staff cannot be expert in all the skills and competencies required to manage, maintain and develop all facets of its road network, and it acknowledges the importance the "smart purchaser" principle plays in reducing its risks in this area.

Understanding Workplace Health and Safety of Staff
This is managed through training of staff and providing them with knowledge of their working environments and the Council's requirements. Council has established procedures for managing workplace health and safety and when formed, Council's Health and Safety committee will meets regularly.

Inspections
Reliance on inadequate or poor inspections can have significant adverse effects. Council endeavours to have all such critical inspections carried out by appropriately trained and experienced people, or at least under their direct supervision. All such reports are reviewed using the smart purchaser principle, external reviews being commissioned where appropriate and necessary.

Level of Service (Higher Standards)
Sudden changes to desired levels of service, can have significant effects on forecast costs of maintenance, renewals and new works. Council will manage these risks using the processes outlined in the levels of service section of this plan.

Legislative Change
Legislative changes, such as the requirement in the 1990s to contract out all financially assisted road works, can have significant implications for Council. Sometimes these changes can reduce costs but often they, at best, result in short-term cost increases. Council manages these risks by reviewing proposed legislation, participation in the Local Government Association and the Road Controlling Authorities' Forum and participating, where appropriate, in the consultation and review process that legislation follows.

Staff also note legislative changes and include the long-term effects of them in budgets at the first available opportunity.

Waka Kotahi NZTA Investment Criteria Changes
The NZ Transport Agency's financial assistance rates can change annually, though in practice they tend to remain stable for longer periods. There is a review of Financial Assistance policy proposed (2012-14). Council is particularly vulnerable to such changes, which although subject to consultation, are rarely changed after the original proposal is published.

Council manages this risk by closely monitoring proposed changes, through its participation in the industry groups mentioned above, by lobbying, and by ensuring that its road maintenance and renewal expenditure remains at relatively constant proportion of the net equalised land value of the District.

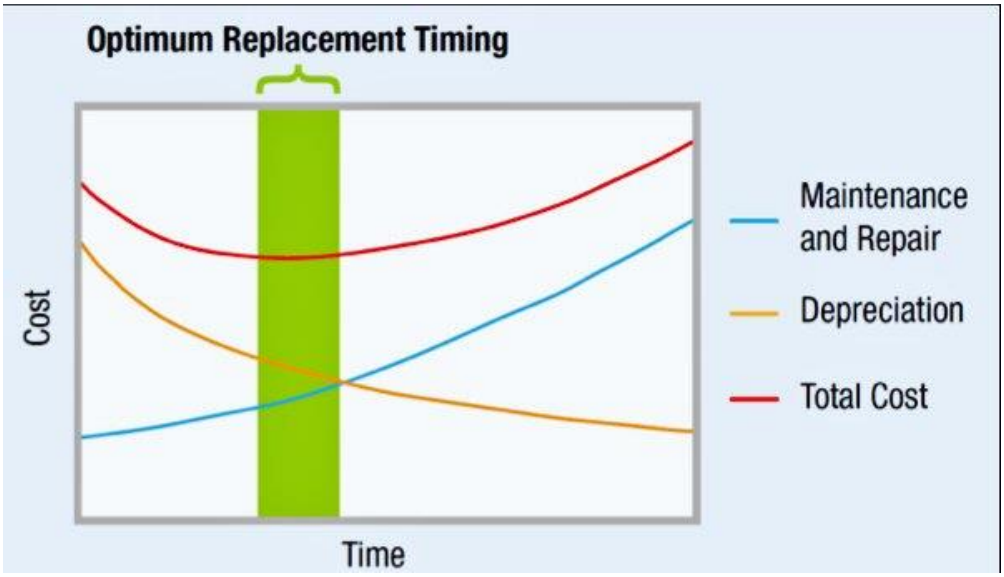
9.5 Asset Renewals Plan

9.5.1 Renewal Planning Overview

This Section identifies how the renewal and replacement of assets will be undertaken. Renewals are significant works that do not increase an asset's original design capacity or improve its original condition. Works over and above restoring an asset to its original capacity and condition are referred to as Improvements and as such are separately identified and funded.

Renewals are distinct from routine maintenance activities. The principal differences being that where routine maintenance is an on-going task occurring from day to day and is necessary to repair wear and tear and keep an asset operating safely, renewal works are periodic and often both expensive and extensive. Renewals restore the service potential of the asset consumed by normal use.

Figure 9.4: Managing Renewal/Replacement of Assets



Asset renewal is undertaken when an asset, or a significant component of an asset, has reached the end of its economic life. Renewals are normally considered at the level to which components are split for valuation purposes. Work that restores the structural integrity of components, e.g. repair of concrete spalling on a bridge, is therefore a maintenance activity and an owning and operating cost as defined by NZ IAS 16 .

9.5.2 Renewal Activities

The renewals sections of the life cycle management section of this Plan provides for:

- The renewal and rehabilitation of existing assets to their original size and capacity.
- The replacement of the entire component of the asset with the equivalent size or capacity.
- The replacement component of new improvement works, i.e. the portion of the work that restores the assets to their original size and capacity.

The asset renewal plans identify the needs and drivers for renewing assets and the expected times those assets will be renewed or replaced. To do this they identify renewal requirements and develop forward financial programmes. The proposed future renewal strategies for each of those groups are explained – a specific requirement of the Local Government Act 2002. There are a number of issues that influence renewal forecasting and the associated works.

These issues include:

- Wear and tear.
- Climate and climatic changes.
- Trends in usage.
- Accuracy of predicted trends.
- Local economic trends and the diversity of industries.
- Changing technology and availability of materials.
- Changing community expectations.
- Changing legislation.

Examples of renewals in the roading context include:

- Resurfacing of sealed and unsealed carriageways.
- Over laying existing pavements with a new structural layers.
- Extensive excavation of existing structural layers and their replacement with new material.
- Replacement of kerb and channel, footpaths, street lights, bridge decks etc. at the ends of their useful lives.

Funding for the majority of Council's roading renewal activities is through its subsidised Land Transport Programme as Activity Class 10 – Renewal of Local Roads. This encompasses the NZTA Work Categories 211 to 231.

Table 9.1 – Waka Kotahi NZ Transport Agency Renewals Work Category Structure

Work Category	Work Category Name
	Renewals of Local Roads
211	Unsealed road metalling
212	Sealed road resurfacing
213	Drainage renewals
214	Sealed Pavement rehabilitation
215	Structures component replacements
216	Bridge and structures renewals*
221	Environmental renewals
222	Traffic services renewals
225	Footpath Renewal*

* New Work Categories qualifying for Waka Kotahi NZTA Financial Assistance from the 2021-24 National Land Transport Plan (NLTP)

Renewal works may be undertaken as separate contracts or, depending on the scale of works, be incorporated in maintenance contracts. The method of delivery is irrelevant to this definition. It is nevertheless important that renewal costs be identified separately.

9.5.3 Renewal Strategy and Funding mechanism

Relative Priorities

For the purpose of allocation of available funds, a broad renewal priority order is necessary. This is a guide only, and can be varied if circumstances warrant. The priority order reflects the goals of safety and road efficiency.

- Resealing.
- Bridge Replacement.
- Area wide treatment, road pavement rehabilitation and reconstruction.
- Footpaths reconstruction and resurfacing.
- Road Signs, Markings and Control Structures.
- Other Works.

Headline 9.3:
There is a balance between the construction of new assets, and the maintenance and renewal of existing assets. The context and funding situation are part of this balance. Timing is a key factor in renewals planning.

Renewal Standards

- Renewal works comply with the following technical standards:
- NZTA specifications including the TNZ series.
- Austroads — Guide to Traffic Engineering Practice.
- Austroads — Guide to the Structural Design of Road Pavements.
- New Zealand Standards.
- Relevant Selwyn District Council Engineering Standards, policies and guidelines.

Asset Groups

The life cycle management plans describe the renewal of each asset group separately. Asset groups can include segments that are funded in different work categories. This particular format has been chosen because it allows better understanding of the relationships between the components of an asset group, and makes the links between the renewals of those components clearer. The format used can also be read directly in conjunction with Selwyn District Council's Transportation Programme Business Case 2021/22 – 2023/24

Each asset group covers the details of the Council's physical assets, and includes information relating to:

- Condition
- Performance
- Criticality
- Capacity
- Asset lives
- Asset value and depreciation
- Risk Management
- Asset disposal

9.5.4 Renewals Planning Tools

Identification
The purpose of cyclic renewal, replacement or rehabilitation strategies is to provide for the progressive replacement of individual asset components that have reached the end of their useful lives. Renewal works should be scheduled to occur 'just when the asset or a component of the asset is worn out'.

Roading has a large asset base with a large number of different contributing asset types with different service lives and use rates. In this circumstance, renewals can be regarded as the work needed to maintain the value of the network over the long term. The timing of renewals is largely affected by the use and the condition of the asset elements. Renewals should extend an asset's life from that originally envisaged.

The overall objective for rehabilitating and renewing pavements is to apply the correct treatments at the optimum time so that the required level of service is delivered whilst minimising total life cycle costs.

Renewals expenditure levels are set and adjusted on the following basis:

- The age profiles of the assets.
- The condition profile of the assets.
- The criticality/risk profile of the asset.
- On-going maintenance requirements and costs.
- The life expectancies of individual asset components.
- Items that warrant no significant expenditure are not "renewed"; they are scheduled for disposal.

Failure to plan and implement adequate and appropriately timed cyclic asset renewal programmes will result in a decline in the overall standard and performance of the asset or individual asset components. This will lead to increasing costs of ownership and use, unless the component is abandoned and withdrawn from service.

The Council employs a number of techniques to assist it in establishing the most appropriate time in an assets life for renewal to occur. These techniques include:

Deterioration Modelling (dTIMS)
In this context, Deterioration Modelling is the predictive modelling of network components and network use to:

- Generate expected performance curves for asset components over time.
- Generate a list of feasible alternatives for addressing the deterioration of the asset.
- Include the costs borne by road users in the decision making process.
- Optimise the available renewal strategies for different funding levels.
- Prioritise interventions for different funding levels.
- Report on the results of the analyses.

Council carries out deterioration modelling of its pavements using NZ dTIMS CT software. This software is accepted by the NZTA as being fit for purpose. Other procedures based on condition rating surveys have been developed to assess the condition of footpaths, kerb and channel and street lights.

dTIMS provides outputs ranking optimised projects at a network level for incorporation into a forward works programme. A significant output of the forward works programme is the sealed roads reseal programme.

Benefit Cost Ratio Analysis
Benefit Cost Ratio (BCR) analysis is explained in the NZTA Economic Evaluation Manual and is essentially a project level tool. It considers the costs of various project options over a 25-year period and the user and social costs associated with each option over that time period to determine the best option for completing a project.

It is only one of a number of criteria used by the Agency to assess if the work or project is eligible for financial assistance.

Least-Cost Analysis
The principal difference between a least-cost (or least maintenance-cost) analysis and a BCR is that the least-cost analysis considers only roading infrastructural costs and ignores the vehicle operating and time travel cost borne by road users.

Least-cost analysis can be used at both project level and at network level. In the latter case, it is carried out using the Treatment Selection Algorithm included in the RAMM software package.

Financial Modelling
Council is required to value all its assets regularly. This accounting procedure also establishes depreciation charges that may be used to fund the renewal of the asset. Valuation and depreciation of transportation assets is discussed further in Part 11 – Financial Summary.

The financial depreciation charges obtained by analysis can be interpreted as a statement of the value of the service potential of the asset, or its components, that is lost or consumed through its use. The Council uses the Asset Valuation Module in RAMM to calculate the replacement cost, depreciated replacement cost and annual depreciation costs of its transportation assets, with the exception of street lights and bridging which are valued separately.

In most instances depreciation is used as a check against other predictions of deterioration, and vice-versa. However, in some cases, such as the signs asset, it serves as the best proxy for the behaviour of the asset.

The renewal works and projects in this Life Cycle Plan have principally been developed using data from asset valuations. Where possible the valuations utilise condition and deterioration modelling tools including RAMM and dTIMS for assessment of remaining useful life.

End of Life Projections
Base lives and remaining lives are determined using the methodology set out in the International Infrastructure Management Manual, and are documented in the current asset valuation. A copy of this Report is included in Part 11 – Financial Summary.
Age and condition profiles are used to determine remaining useful asset lives and forward renewal programmes that are intended to maintain the overall standard of the system

9.6 Asset Improvement and Development Plan

9.6.1 New Improvements

"New Improvements" generally refers to new works; it is also often referred to as "CapEx" (for capital expenditure) that result in additional asset capacity and infrastructure to meet:

- Changes in demand for transportation network services under the Council's control.
- The levels of service and standards that have been adopted by the Council.
- The demands imposed by growth originating from both the Council's decisions and the private sector.

Improvement works can be carried out by Council to improve current levels of service or to meet the demands of growth. Funding for a portion of Council's roading improvement activities is through its subsidised Land Transport Programme as Activity Classes 1 – Road to Zero (Safety Improvements), 4 – Walking and Cycling Improvements, and 12 – New and Improved Infrastructure for Local Roads This encompasses the NZTA Work Categories 321 to 351.

Table 9.1 – Waka Kotahi NZ Transport Agency Improvements Work Category Structure

Work Category	Work Category Name
	Local Road Improvements
321	New Traffic Management Facilities
322	Replacement of bridges and other structures
323	New roads
324	Road improvements
325	Seal extension
332	Property purchase - local roads
333	Advance property purchase - local roads
341	Low cost, low risk roading improvements
351	Resilience improvements

Level of service improvements can be to remedy current level of service deficiencies, or to meet changed levels of service adopted by Council. For example, rural seal extensions generally address current level of service deficiencies associated with unsealed roads, whereas construction of off-road cycleways addresses a new or changed level of service.

Improvement works are also vested in the Council by private developers as they complete new urban subdivisions and similar works. Conditions that require new works or upgrades can be established and applied as Financial Contributions under the Resource Management Act, as part of a resource consent, or as Development Contributions applied under the Local Government Act 2002. Where the improvements required of a developer have recognisable benefits to the wider community the Council contributes pro-rata to the total cost of those works.

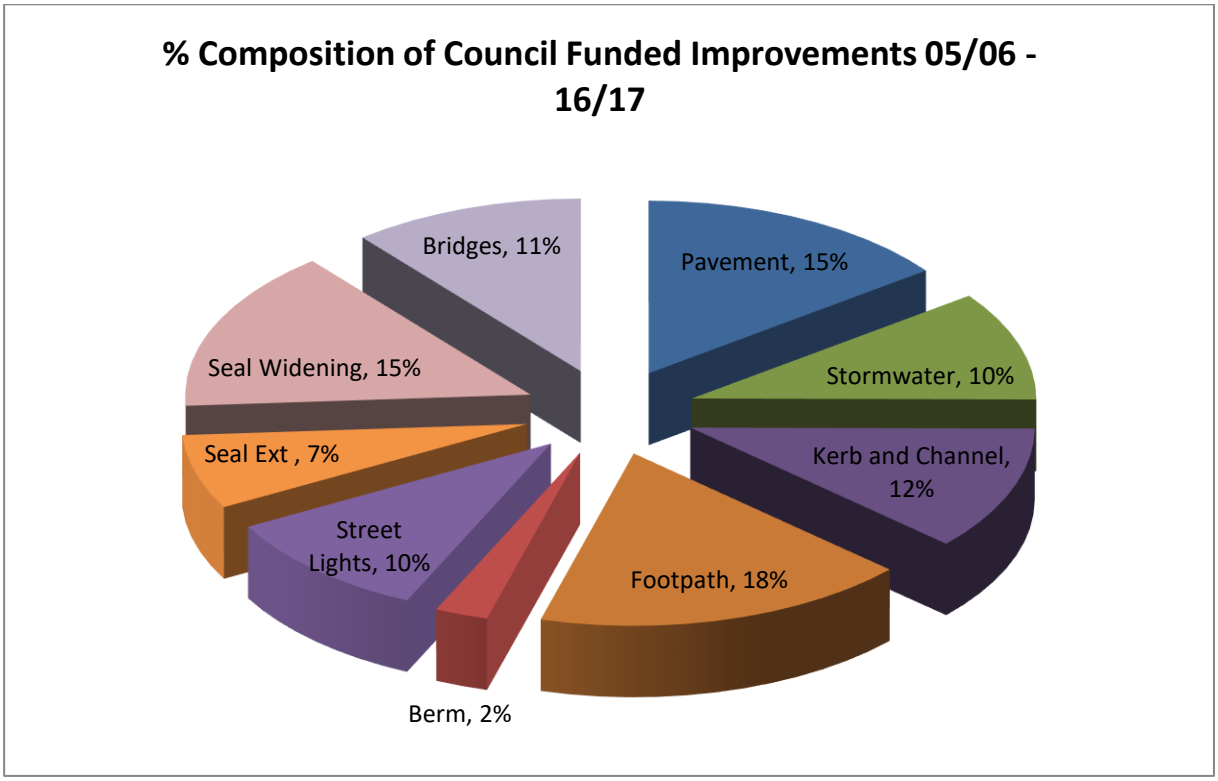
New Improvement sections of the life cycle management plans identify future new improvement works, and explain the proposed future development strategy in terms of 'how' the provision of additional asset capacity will be undertaken. This is a specific requirement of the Local Government Act 2002.

In addition, the effects of new improvements vested in the Council are considered, based either on known developments or in high growth parts of the District on trends derived from data gathered during that growth.

In this context, demand forecasting is particularly important as it provides the basis for changing requirements for the service provided and related costs. Demand forecasting also needs to keep pace with the level of new improvements that are introduced and changes in the underlying existing assets.

The following graph shows the distribution of asset improvements, produced by both the Council's improvement programmes and the improvements vested by private developers, for each significant asset group.

Figure 9.1.5: Summary Asset Improvements Composition



Source: Transportation Improvement Works Summary

9.7 Asset Disposal Plan

Strategy
To identify and actively manage assets which are no longer fit for purpose.

Asset Disposal
Disposal activities are associated with the removal from service of a redundant or surplus asset. Assets may become surplus to requirements for any of the following reasons:

- Under-utilisation.
- Obsolescence.
- Provision exceeds required level of service.
- Uneconomic to upgrade or operate.
- Policy change.
- Service provided by other means (e.g. private sector involvement).
- Potential risk of ownership (financial, environmental, legal, social, vandalism, etc).

To date the only significant disposals that have occurred have been associated with bridges (See Section 9.), and pavements bypassed where road realignments have occurred.

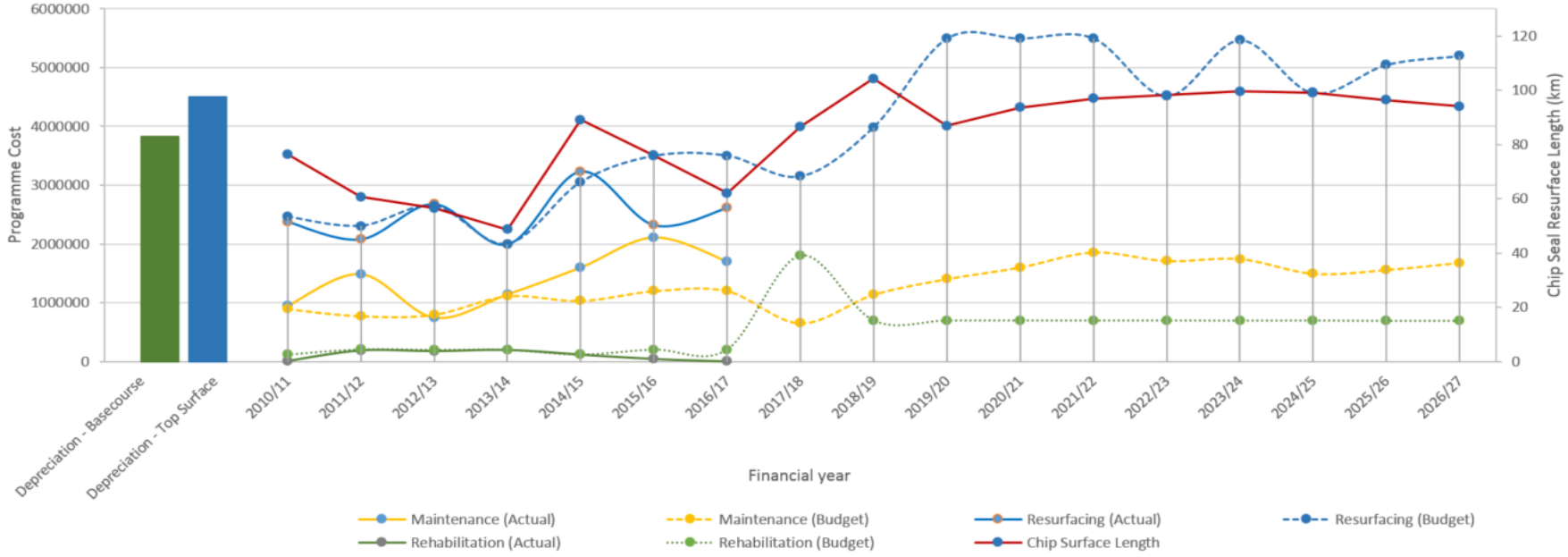
9.8 Lifecycle Funding

20 Year Funding and Depreciation

Council's approach is to develop a twenty – thirty-year renewal plan at an Asset Group level and validate the funding level required against the depreciation calculation. Effectively, the renewal plan is funded rather than the theoretical depreciation value.

An example of Council's developed Life Cycle funding strategies is illustrated in the graph below. The modelled scenario details the historic and planned investment in sealed pavement management activities, including sealed road maintenance, sealed road resurfacing and pavement rehabilitation expenditure. The graph only shows the Waka Kotahi NZTA financially-assisted programme and excludes the $1million dollars of unsubsidised investment by Council for targeted pavement rehabilitations, which commenced in 2015/16. The depreciation of assets is based on the 2017 Asset Valuation.

Figure 9.10 6: Renewal Programme versus Depreciation Calculation



Source: Strategic Investment Assessment (Waugh)

Items of note include:

1. The quantity of pavement rehabilitations that are proposed are significantly less than the depreciation suggests. This highlights the need for robust condition-based Forward Works Programme development and the appropriateness of a renewals funding model. As the ONRC model is implemented further this may well be reflected in the renewal approach to low volume/access roads.
2. Resealing has been below the depreciation level and is projected to be higher in future.
3. Resealing rates are volatile, but reflect a long term increase that is significant. Estimates for reseal budgets and quantities achieved will vary from year to year.

Peer Review of Lifecycle Management and Funding

As part of the development of the Programme Business Case, Council considered its renewal inputs from a range of sources:

1. Detailled asset condition, age and performance information.
2. dTIMS modelling.
3. Investment levels to date.
4. Engineers judgement.
5. Work Input estimates.
6. Affordability (Selwyn District Council and Waka Kotahi NZTA).

Council has used rates based on actual work costs over the last three years to formulate the estimates for resurfacing and pavement rehabilitation.

9.9 Lifecycle Risk Management

9.9.1 Treating and Monitoring Risks

For a particular project or work item, the probability of failure to deliver its desired contribution to achieving levels of service is affected by a number of factors, including:

- Planning and design (Lifecycle) – human resource support, climatic based influences
- Construction
- Maintenance
- Operation
- Monitoring
- Renewals

All of these factors can impact on a successful outcome and will affect the lifecycle cost of the asset involved.

There is, therefore, a need to thoroughly assess the lifecycle cost of projects and Continuous Programmes, and compare costs of options that are deemed to deliver the same outcome (generally as a reinstatement of, or improvement to, levels of service). Lifecycle costing is of course, a fundamental principle behind good asset management. Implementation of good planning, design, construction, maintenance, operation and monitoring will minimise the probability of failure to deliver the programme's contribution to levels of service.

9.9.2 Prioritisation of Expenditure to Manage Risks

New Assets, Operations and Management Improvements
The successful management of the Transportation activity is dependent on the coordination of a multitude of activities that generates a work programme that consist of planning, designing, construction, operation, maintenance and monitoring of the assets.

There are inevitably competing demands placed on the Maintenance, Operations and Renewals budgets and Capital (Asset) Improvement expenditure budgets that are available for the Transportation Activity. Decision making processes must ensure that expenditure is allocated fairly and wisely according to the needs of existing and future generations and in a way that is affordable.

Existing Assets
Typically, assets are replaced when there is unacceptable risk to levels of service because of:

- Asset condition
- Operability
- Vulnerability to external influences (earthquake, flood, fire etc)

In the future, subject to the availability of resources, it is intended that selection and prioritisation criteria for asset renewals will put a greater emphasis on condition, performance, risk and failure history assessment.

Currently there are sufficient processes in place to monitor road pavements (including both the pavement structure and surfacing) and bridges to ascertain the renewal programme required.

9.10 Issues

While this section of the plan requires substantial review there is a satisfactory understanding of the Lifecycle Management processes in place and experienced staff are able to manage the issues at hand.

Specific items identified are identified below.

Improvement Plan items

IP 9.1 Consider introduction of High Speed Data Collection as a replacement of/addition to manual rating.

IP 9.2 Internal professional services costs have previously been calculated based on six Full Time Equivalent (FTE) positions relating to subsidised transport activities conducted under the Councils Land Transport Programme, a project to review this resourcing and identify any needs to increase in order to manage the activity properly is proposed. Ongoing.

IP 9.3 Establish a policy for surfacing treatment to determine if AC surfacing is required (or not accepted) when roads are vested, and what resurfacing treatment will be used in future.

IP 9.4 Establish a policy for applying the Extent of Network Maintenance and the levels of service that will be provided, where roads serve only one or two properties, or extend beyond the residences on rural properties. Although of a low standard, their very low use is such that they are considered uneconomic to maintain.

IP 9.5 Refine categorisation and knowledge of the responsibilities for land drains, stock water races, and water race culverts between the transportation and utilities activities, and private ownership.

IP 9.6 Improve footpath inventory and asset data, and develop an indicative renewal plan.